College of Sciences
Department of Physics & Astronomy

كلية العلوم
قسم الفيزياء والفلك

Final Exam
Academic Year 1443 Hijri- Second Semester

Exam Information معلومات الامتحان			
Course name	**General Physics**		**اسم المقرر**
Course Code	**PHYS 109**		**رمز المقرر**
Exam Date	**06/06/2022**	**07/11/1443**	**تاريخ الامتحان**
Exam Time	**8:00 am**		**وقت الامتحان**
Exam Duration	**3.0 hours**	**3.0 ساعات**	**مدة الامتحان**
Classroom No.			**رقم قاعة الاختبار**
Instructor Name			**اسم استاذ المقرر**

Student Information معلومات الطالب		
Student's Name		**اسم الطالب**
ID number		**الرقم الجامعي**
Section No.		**رقم الشعبة**

General Instructions:
Mobiles and smartwatches should be closed under your seat.
Write your answers (only one letter) in the right column.

تعليمات عامة:
يجب إبقاء الهواتف والساعات الذكية مغلقة أسفل المقعد.
اكتب إجاباتك (حرف واحد فقط) في العمود الأيمن.

هذا الجزء خاص بأستاذ المادة
This section is for the instructor only

#	Course Learning Outcomes (CLOs)	Related Questions	Points	Final Score
1	CLO 1: **basic concepts and methods of classical mechanics.**	1-27	40	

If needed, use:

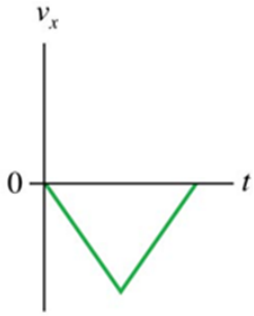
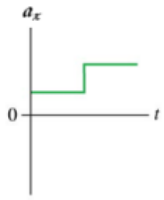
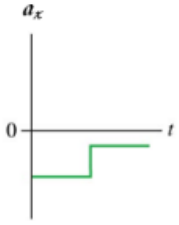
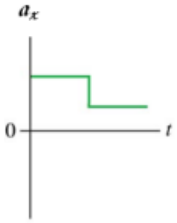
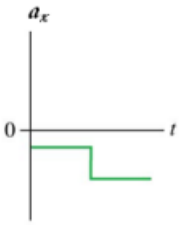
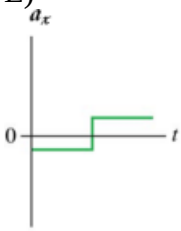
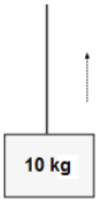
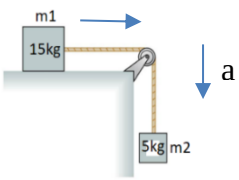
$$g = 9.8\ m.s^{-2}$$

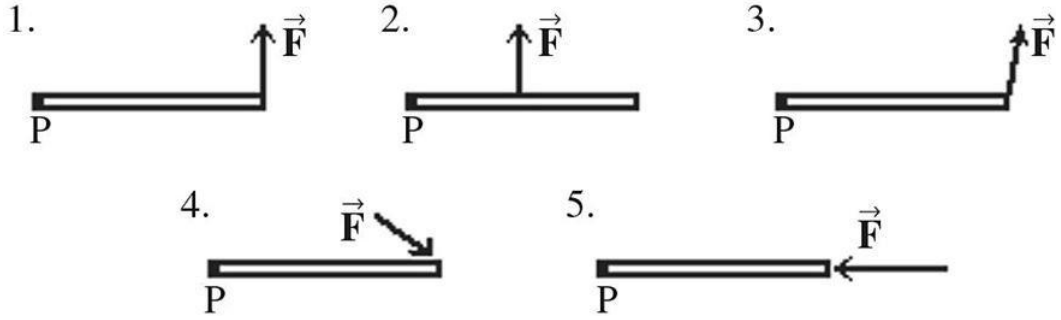
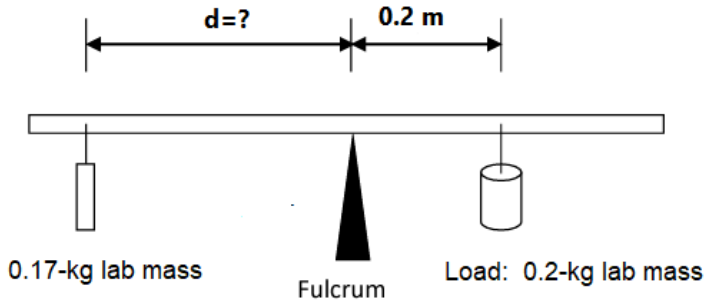
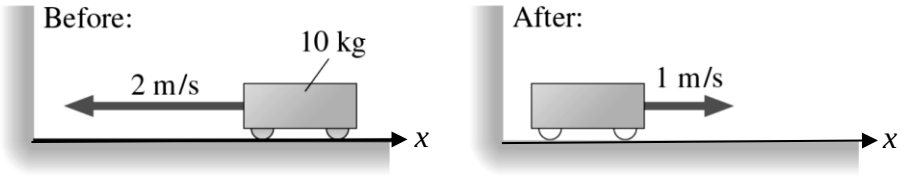
$$\rho_{water} = 10^3\ kg/m^3$$

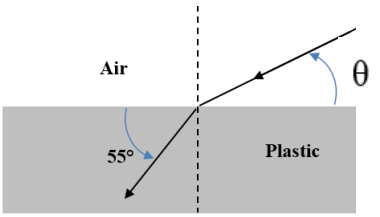
$$k = 1/4\pi\varepsilon_o = 9 \times 10^9\ N \cdot m^2/C^2$$

$$\varepsilon_o = 8.854x10^{-12}\ F/m$$

Version A

No.	Question	Answer
01	The acceleration-versus-time graph that matches the velocity-versus-time graph shown below is:  A)  B)  C)  D)  E)  	E
02	An object starts from rest and uniformly accelerates at a rate of 2 m/s^2 for 5.0 seconds. The object final velocity, in m/s, is: A) 5 B) 10 C) 12 D) 15 E) 22	B
03	A 54 kg block is placed on an inclined plane that is 42° from the horizontal. The magnitude of the normal force F_N, in N, is: A) 354 B) 393 C) 939 D) 36.1 E) 40.1	B
04	A constant force causes an object to accelerate at 2 m/s^2. The acceleration of an object with twice the mass that experiences the same force, in m/s^2, is: A) 1 B) 2 C) 4 D) 6 E) 8	A
05	A Boeing jet of mass 50,000 kg sits at rest. The pilot turns the pair of jet engines to full throttle. After traveling 720 m, the plane reaches its takeoff speed of 50 m/s and leaves the ground. The thrust of **the pair of jet engines,** in kN, is: A) 55 B) 67 C) 73 D) 87 E) 95	D
06	A rope is used to pull a mass of 10 kg vertically upward. Starting from rest, the mass acquires a velocity of 4 m/s in 8 s. The tension in the rope, in N, is:  A) 98 B) 32 C) 103 D) 0 E) 10	C
07	A 15 kg box rests on a frictionless horizontal surface attached to a 5 kg box as shown in the figure. The acceleration of the system, in m/s^2 will be  A) 6.0 B) 0.51 C) 1.55 D) 2.45 E) 0	D

08	As shown in the figure, a given force is applied to a rod in different ways. In which case is the torque about the pivot P due to this force the greatest?  					A
	A) 1	B) 2	C) 3	D) 4	E) 5	
09	A 0.2 kg mass is placed on the meter stick 0.2 m from the pivot. A 0.17 kg mass is used to balance the system. How far, in m, will it have to be located from the fulcrum to keep the system in balance?		 			B
	A) 1.30	B) 0.24	C) 0.63	D) 0.11	E) 0.90	
10	 The cart's change of momentum, in kg.m/s, is:					E
	A) -20	B) -10	C) 10	D) 20	E) 30	
11	A 900 kg car is traveling at 20 m/s. It strikes an 1800 kg car that has zero momentum. After the collision the two cars stick together. The magnitude of their velocity after the collision, in m/s, is:					A
	A) 6.7	B) 13.3	C) zero	D) 20	E) 180	
12	A truck has four times the mass of a car and is moving with twice the speed of the car. If K_t and K_C refer to the kinetic energies of truck and car respectively, it is correct to say that					A
	A) $K_t = 16K_C$	B) $K_t = 4K_C$	C) $K_t = 2K_C$	D) $K_t = K_C$	E) $K_t = \frac{1}{2}Kc$	
13	A 1000 kg sports car accelerates from 0 to 30 m/s in 10 s. The average power developed by the engine, in kW, is:					A
	A) 45	B) 15	C) zero	D) 30	E) 90	
14	The foot of a man has an area of 300 cm^2. If the mass of the man is 72 kg, the pressure exerted by the man on the ground, in Pa, is:					B
	A) 2420	B) 23520	C) 2160	D) 27650	E) 28440	
15	Water flows through a 0.05 m radius pipe at 12 m/s. The speed of water when the pipe narrows to 0.025 m radius, in m/s, is:					C
	A) 18	B) 32	C) 48	D) 5	E) 78	

16	A horizontal pipe of diameter 6 cm has a constriction of diameter 2 cm. The velocity of water in the wide pipe is 0.3 m/s and the pressure is 100000 Pa. The pressure in the constriction is:					B
	A) 211.6 Pa	B) 96.4 kPa	C) 8200 Pa	D) 8290 kPa	E) 8.29 Pa	
17	If the index of the plastic is 1.33, then the angle θ is: 					B
	A) 48.9°	B) 40.3°	C) 33.6°	D) 38.7°	E) 39.8°	
18	A **diverging** lens with a focal length of 50 cm is placed 100 cm from a 3.0 cm height flower. The flower's image has a height of					D
	A) 1 mm	B) 2.5 cm	C) -3 cm	D) 1 cm	E) -2.5 cm	
19	Two point charges, Q_1 and Q_2, are separated by a distance R. If the magnitude of each charge is halved and their separation is doubled. The electrical force that each charge exerts on the other is: A) It increases by a factor of 16. B) It increases by a factor of 8. C) It increases by a factor of 2. D) It decreases by a factor of 8. E) It decreases by a factor of 16.					E
20	If the electric field at a point 2.8 cm from a small charged object points outward from the object with a strength of 180 kN/C, then the object's charge q, in nC, is about:					B
	A) -16	B) +16	C) -17	D) +18	E) -19	
21	The force of attraction that a - 40.0 μC point charge exerts on a +108 μC point charge has magnitude 4.00 N. How far apart are these two charges?					C
	A) 2.1 m	B) 3.67 m	C) 312 cm	D) 1.13 m	E) 1.13 cm	
22	A parallel plate capacitor is filled with a 1.0-mm-thick rutile dielectric layer (κ_{rutile}= 100). If the area of the capacitor plates is 1.0 cm^2, its capacitance is:					B
	A) 8.85×10^{-10} F	B) 8.85×10^{-2} nF	C) 8.85×10^{-2} pF	D) 8.85×10^{-2} μF	E) 8.85×10^{-12} F	
23	The SI unit of electric potential is:					E
	A) J/s	B) N/s	C) C/s	D) J/A	E) J/C	
24	If the radius of a resistance wire is halved then its resistivity will be					E
	A) doubled	B) halved	C) tripled	D) quadrupled	E) still constant	
25	The resistivity of a copper wire carrying 5 A current is 1.7×10^{-8} Ω.m. If the wire is 22 m long and the radius of its cross-sectional area is 0.5 mm then its resistance, in Ω, is:					A
	A) 0.48	B) 4.8×10^{-7}	C) 2.8×10^{-7}	D) 4.2×10^{-18}	E) 2.4×10^{-8}	
26	When an unstable nucleus decays by emitting gamma radiation, the atomic number Z of the nucleus					E
	A) increases by 4	B) increases by 2	C) decreases by 2	D) decreases by 4	E) remains constant	
27	Two different radioactive samples A and B with the same number of nuclei are prepared. If the initial activity of sample A is 5 times larger than that of sample B, how do their half-lives compare? A) $t_{1/2}$ of A is five times larger than $t_{1/2}$ of B. B) $t_{1/2}$ of A is five times smaller than $t_{1/2}$ of B. C) $t_{1/2}$ of A is equal to $t_{1/2}$ of B. D) $t_{1/2}$ of A is twenty-five times larger than $t_{1/2}$ of B. E) $t_{1/2}$ of B is twenty-five times larger than $t_{1/2}$ of A.					B